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APPENDIX 16

SC DATA EXTRACTION

FINAL SOFTWARE REPORT

DATA ITEM NO. A005

INTEGRATED ELECTRONIC WARFARE SYSTEM
ADVANCED DEVELOPMENT MODEL (ADM)

7800987-16

PREPARED FOR:

NAVAL AIR DEVELOPMENT CENTER
WARMINSTER, PENNSYLVANIA

CONTRACT N62269-75-C-0070

RAYTHEON

ELECTROMAGNETIC
SYSTEMS DIVISION

1 OCTOBER 1977

APPENDIX 16

SYSTEM CONTROLLER DAT EXTRACTION SPECIFICATION
FINAL SOFTWARE REPORT
DATA ITEM A005

INTEGRATED ELECTRONIC WARFARE SYSTEM (IEWS)
ADVANCED DEVELOPMENT MODEL (ADM)

Contract No. N62269-75-C-0070

Prepared for:

Naval Air Development Center
Warminister, Pennsylvania

Prepared by:

RAYTHEON COMPANY
Electromagnetic Systems Division
6380 Hollister Avenue
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1 OCTOBER 1977

TYPE OF SPEC

COMPUTER SUBPROGRAM DESIGN DOCUMENT

TITLE OF SPEC

DATA EXTRACTION, IEWS, ADM

FUNCTION	APPROVED	DATE	FUNCTION	APPROVED	DATE
WRITER	*Barry Smith*	2-7-77			

REVISIONS

CHK	DESCRIPTION	REV	CHK	DESCRIPTION	REV

REVISION																				
SHEET NO.																				
REV STATUS OF SHEETS	REVISION																			
	SHEET NO.																			

1.0 SCOPE

The Data Extraction Subprogram shall format data extraction data buffers for output to the STE by the EXMSG routine. The Data Extraction Subprogram shall run concurrently with the background ECM software in the RMP, CP and AP processors.

1.1 IDENTIFICATION

Data Extraction Subprogram shall be abbreviated DE.

1.2 SUBPROGRAM TASKS

The DE Subprogram shall be table driven in that each DE point shall provide a pointer to a table entry which specifies what data will be extracted. The DE Subprogram shall assemble the data, attach the current value of system time, and add a header for Executive Message (EXMSG) transfer. The DE Subprogram shall then call EXMSG to transmit the DE message to the STE.

2.0 REFERENCE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the event of conflict, the requirements of this specification shall govern.

2.1 PERFORMANCE SPECIFICATION

The performance specification for the SC Software is Raytheon Document No. 061290529, Computer Program Performance Specification for System Controller Unit, IEWS, ADM. The applicable paragraph is 3.2.5.9.2.

2.2   PROGRAM DESIGN SPECIFICATION

The program design specification for the SC Software is Raytheon Document No. 53959-GT-0750, Computer Program Design Specification, System Controller Program, IEWS, ADM. All sections shall be applicable.

2.3   DATA BASE DESIGN DOCUMENT

The data base design document for the SC Software is Raytheon Document No. 53959-GT-0751, Common Data Base Design Document, IEWS, ADM. All sections shall be applicable.

2.4   MISCELLANEOUS DOCUMENTS

The following miscellaneous documents shall form a part of this specification where applicable:

53959-GT-0756   Executive Design Document, IEWS, ADM

3.0   REQUIREMENTS

3.1   DATA EXTRACTION

All data sent to instrumentation in the STE shall be handled by the Data Extraction (DE) Subprogram. The DE Subprogram shall assemble the data and shall pass it to the executive as an executive message in the normal manner. The executive will pass the data through its Interprocessor Communication (IPC) Subprogram until it finally reaches the sender subprogram in the RMP. The sender will store the data in the RMP/STE shared memory where a receiver will pick it up for display and/or storage.

The flow chart of subprogram DE is shown in Figure 1. This subprogram shall be loaded with SC software to produce memory or register data dumps during program execution as a monitor of software and hardware performance of the IEWS system.

If the DE point relates to an EFN (e.g., the contents of an ETF entry), the EFN shall be passed to the DE Subprogram in the A register. The DE Subprogram shall pack the 8 LSB's of the A register into the 8 LSB's of a header word called the STE OP word. If the EFN is of no significance, then the 8 LSB's of the STE OP word can be used for other purposes. Generally, the STE OP code will serve to identify the data extraction point.

The call to the DE Subprogram shall be followed in the code by a table address (TBAD) which shall point to the first word of a table specifying the type of output that DE will format.

The table-driven nature of DE shall allow flexibility is specifying the memory or register data to be dumped for each DE call and in enabling or disabling DE calls on an individual. function, or processor level.

It shall be possible to enable/disable DE points at any of three levels:

(a) Enable/disable all DE points within a processor

(b) Enable/disable all DE points with a given STE OP code

(c) Enable/disable all DE points using the same DE table

The DE Subprogram shall test the enable flags for each of these points and provide data extraction only if all three enable flags are set.

The DE Subprogram shall obtain temporary message storage by calling EXMSG and shall place one of three message formats into the message as follows:

(a) Output contents of 16 specified address locations

(b) Output contents of 16 consecutive address locations

(c) Output register values only

The DE Subprogram shall output the data by calling EXMSG and then return the temporary storage by calling EXMSG a third time.

3.2   SUBPROGRAM FLOW DIAGRAMS

The DE subprogram shall follow the logic of the flowchart given in Figure 1.
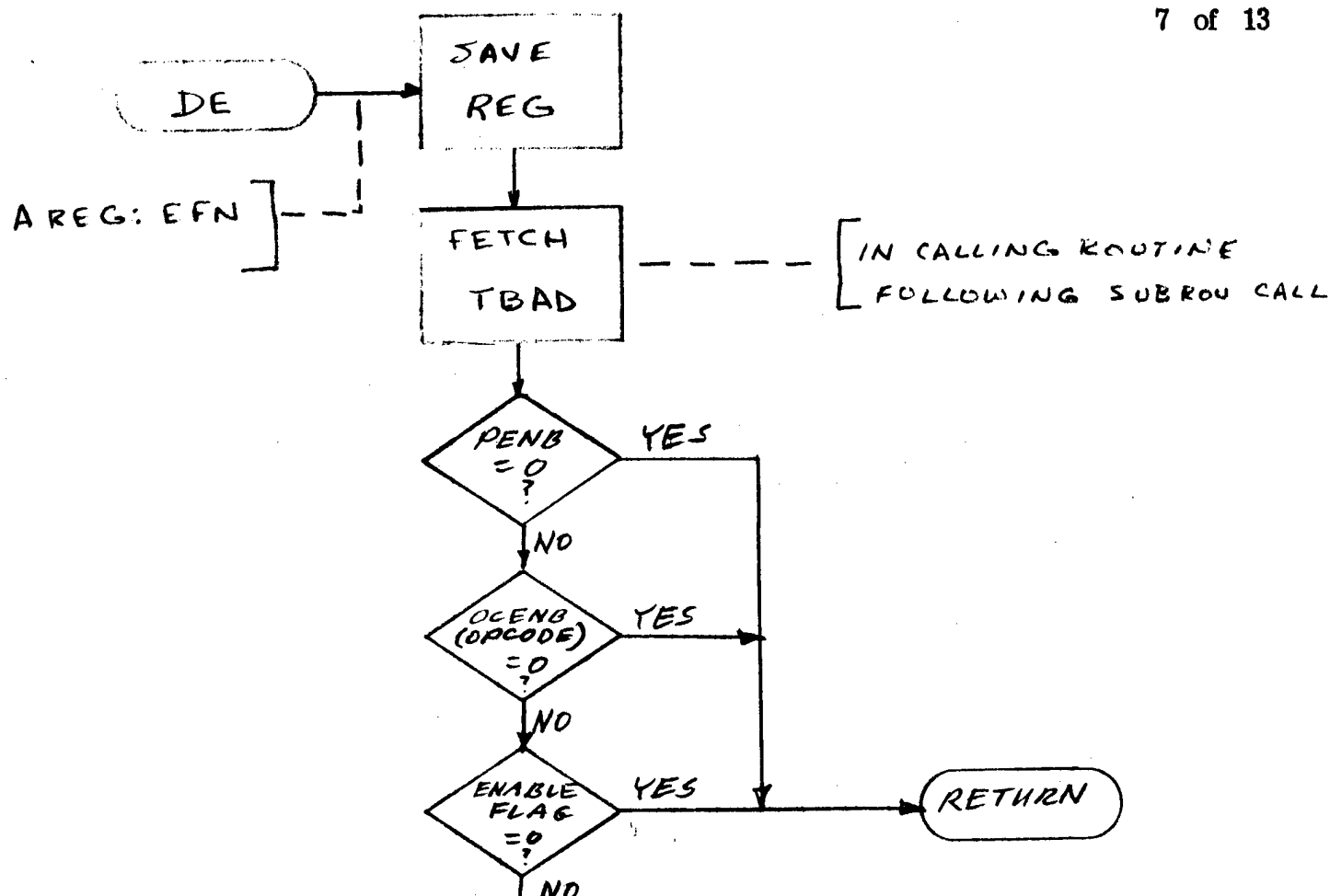
FIGURE 1. DE SUBPROGRAM FLOW CHART SHT 1 OF 2

FIGURE 1. DE SUBPROGRAM
FLOW CHART
SHT 2 OF 2

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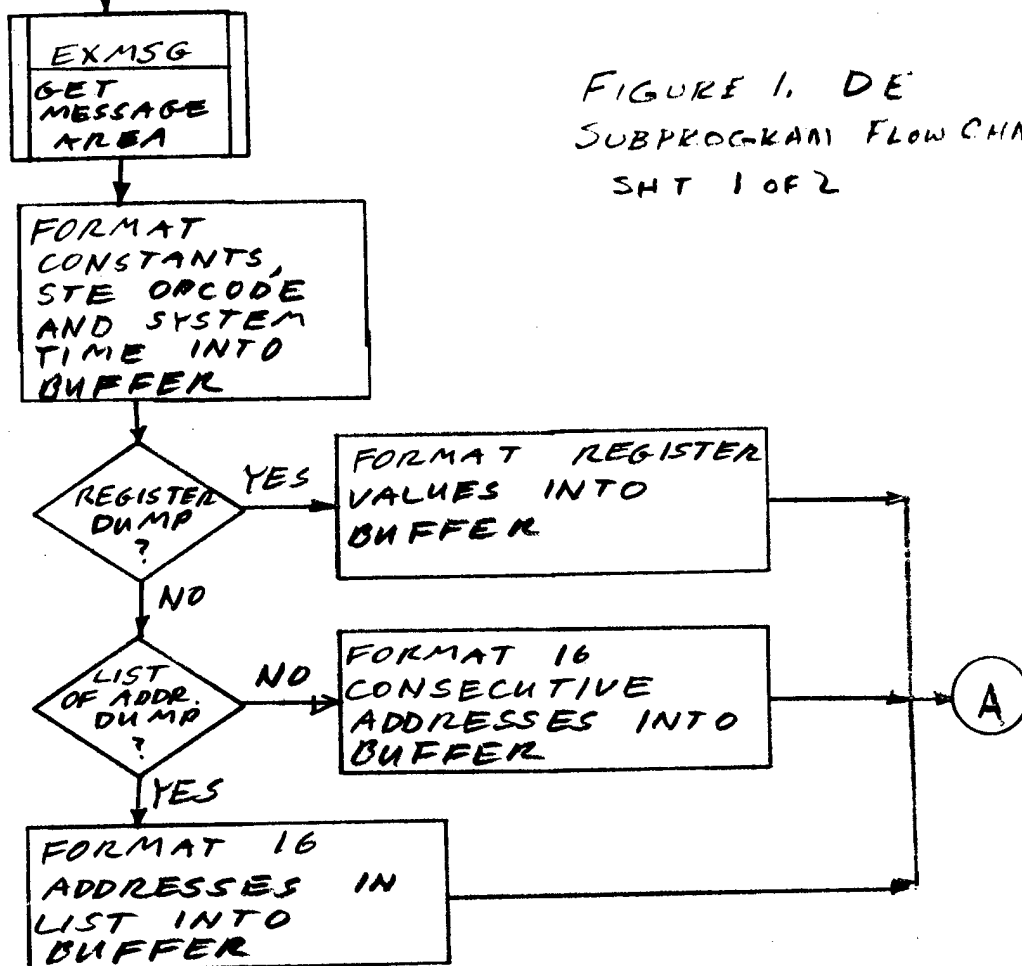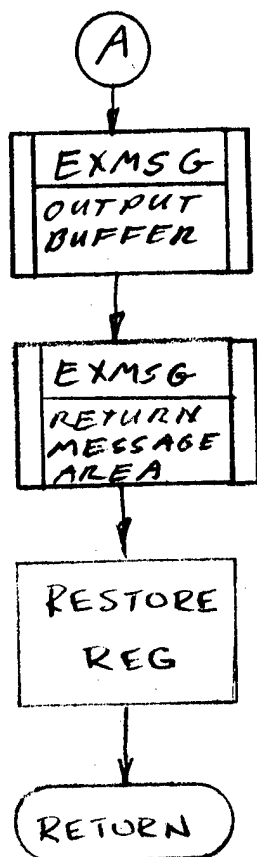
3.3   COMPUTER SUBPROGRAM ENVIRONMENT

3.3.1   Tables

3.3.1.1   Data Dump Table

This table shall be defined by the calling routine and shall be passed to DE to describe the data to be included in this DE dump. The table shall take one of three formats depending on the type of data dump it is describing:

      (a) Non-Contiguous Memory Dump:

          1. Enable flag
          2. STE OP Code in 8 MSB's
          3. Address of 1st data word
          4. Address of 2nd data word
            .
            .
            .
            .
        18. Address of 16th data word

      (b) Contiguous Memory Dump:

          1. Enable flag
          2. STE OP Code in 8 MSB's
          3. 0
          4. Address of 1st of 16 data words

      (c) Register Dump:

          1. Enagle flag
          2. STE OP Code in 8 MSB's
          3. -1

3.3.1.2   OP Code Enable Flag Table

This table shall be internal to DE and shall be constant with respect to DE and all SC software. However, the table can be modified at assembly time or at run time by the debugger. This table shall contain 128 flags corresponding to the 128 possible STE OP Codes. Use of these flags is described in Section 3.3.4.

3.3.2   <u>Variables</u>

There shall be no variables in the DE Subprogram data

base.

3.3.4   Flags

The implementation of data extraction points shall be controlled by three levels of flags within each processor containing the DE Subprogram. For a data extraction point to be enabled, that is, for the data dump described by that particular point to be formatted and passed to the STE, each of the three flags associated with that point shall be set.

(a) Level 1, PENB Flag in DE

This flag, when cleared shall disable all data extraction points within that processor

(b) Level 2, OCENB Flag Table in DE

Each of the 128 flags, when cleared shall disable all data extraction points with the corresponding STE OP Code value (0 to 127).

(c) Level 3, Data Dump Table Enable Flag

This flag, when cleared, shall disable the data extraction points referencing that table.

3.3.5   Indices

There shall be no indices in the DE Subprogram.

3.4 INPUT/OUTPUT FORMATS

3.4.1 Calling Sequence

The calling sequence to the DE Subprogram shall have the

form:

LDA	EFN	(Optional)
JSUB	DE	(Jump to DE)
TBAD		(Table Address)

3.4.2 EXMSG Message Buffer

1) 5
2) 19
3) STE OP Code
   Table OP Code plus LSB byte of A register
   of calling routine
4) MSB system time
5) LSB system time
6) 1st Data word or A Register
7) 2nd " " " B "
8) 3rd " " " E "
9) 4th " " " X "
10) 5th " " " S "
11) 6th " " " PC of calling routine
12) 7th " " " garbage

   .   .   .
   .   .   .
   .   .   .
   .
21) 16th " " " "

3.4.3 STE Message Buffer

19 word buffer consisting of words 3 to 21 of EXMSG buffer.

3.5 REQUIRED SYSTEM LIBRARY SUBROUTINES

There shall be no system library subroutines required by the DE Subprogram.

3.6 CONDITIONS FOR INITIALIZATION

The DE Subprogram shall have unconditional entry.

3.7 SUBPROGRAM LIMITATIONS

The DE Subprogram shall be limited to outputting 16 words of data.

3.8 INTERFACE DESCRIPTION

Software interfaces to other modules shall consist of the tables described in the tables, flags, and input/output format sections. The interface shall be as shown in Figure 2.

```
┌──────────┐      ┌──────────────┐      ┌──────────┐
│ Calling  │─────▶│    Data      │◀────▶│  Exec    │
│ Routine  │      │  Extraction  │      │  Msg     │
│          │      │    (DE)      │      │ (EXMSG)  │
└──────────┘      └──────────────┘      └──────────┘
```
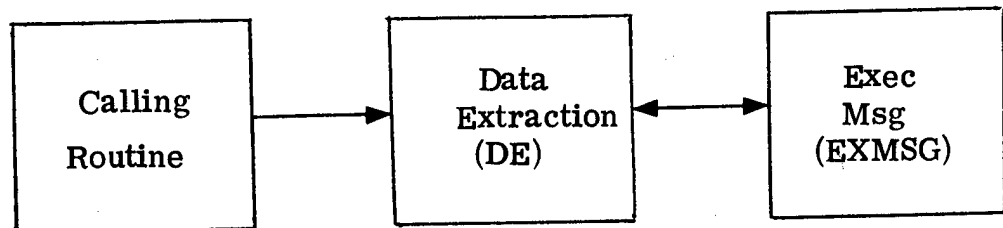
Figure 2. Interface Description